

Land of Plenty

Diversity as America's Competitive Edge
in Science, Engineering and Technology



Summary of the Report of the Congressional Commission on the Advancement of Women
and Minorities in Science, Engineering and Technology Development
July 2000

A Homegrown Answer to America's Skilled Labor Dilemma

America's unprecedented prosperity at the start of the twenty-first century is fueled by the nation's science, engineering, and technology (SET) enterprise. But in this climate, it can be easy to forget that the new economy is especially dependent on—and thus vulnerable to—the talents and knowledge of its workers.

An increasingly large share of the work force consists of women, underrepresented minorities, and persons with disabilities—groups persistently underrepresented in SET careers. This significant shift in U.S. work force demographics is occurring even as the number of SET jobs skyrockets.

If America is to prosper in the new millennium, we must build a domestic SET work force that taps the talents of all segments of our population and therefore reflects the rich diversity of our nation. Toward this end, Congress established the Commission on the Advancement of Women and Minorities in Science, Engineering and Technology Development (the Commission) (P.L. 105-255, approved October 14, 1998). The Commission was charged with setting forth recommendations to help build a domestic work force capable of meeting our nation's strategic SET needs. The Commission recommends policies and programs that:

- advance the full and equitable participation of all Americans in SET education;
- increase the number of qualified American scientists and engineers by expanding the talent pool to include more women, underrepresented minorities, and persons with disabilities; and
- enhance the nation's economic capacity and technological growth in this era of global competitiveness.

This brochure summarizes the background information, recommendations, and action steps to be found in the full report. To find out how to obtain a copy of this report, visit our Web site (www.nsf.gov/od/cawmset) or call **703-306-0597**.

The recommendations touch on all areas of the SET pipeline—from early childhood classrooms to the boardroom, from public policy to public image. Only by working together can government, business, academia, and the public make investments that will reap benefits for all of us today and tomorrow.

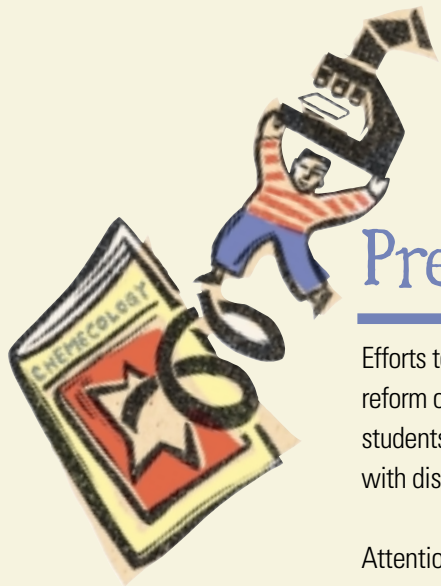
A National Imperative

Today's U.S. economy depends more than ever on the talents and knowledge of skilled, high-tech workers. To sustain America's preeminence, we must take dramatic steps to change the way we develop our work force. An increasingly large proportion of the work force consists of women, underrepresented minorities, and persons with disabilities—groups not well represented in the SET pipeline. Unless the SET labor market becomes more representative of the work force as a whole, the nation may well face severe shortages in SET workers, such as are already seen in many computer-related occupations. The current tendency to look abroad for talent continues to encounter short-term obstacles and is unlikely to provide any long-term solutions, given the difficulty of locating skilled workers in an increasingly competitive, global labor market.

More Americans can and will fill SET jobs if barriers are removed that impede their access to high-quality education in science, mathematics, and engineering. The Commission's recommendations focus on steps that will permanently:

- broaden accessibility to quality SET precollege education for all Americans, particularly underrepresented minorities (African Americans, Hispanics, and American Indians);
- increase the number of women, underrepresented minorities, and persons with disabilities who are well prepared to enter the SET labor market; and
- increase the retention and reentry of women, underrepresented minorities, and persons with disabilities in SET education and the SET work force.





Precollege Education

Efforts to boost the number of skilled U.S. workers must begin with the reform of precollege education, which has been failing to adequately prepare students—especially women, underrepresented minorities, and persons with disabilities—in science, mathematics, and technology.

Attention to SET education must begin as early as the preschool years (0 to 4 years), when the learning process begins. Many factors discourage girls, underrepresented minorities, and children with disabilities from imagining themselves in SET careers and learning the skills necessary to participate in SET. Such factors include misperceptions about these students' SET abilities, the lack of access to high-quality mathematics and science curricula and resources, and the lack of higher-profile role models.

The Commission supports precollege reform efforts now underway that:

- focus on better preparation, added support, and professional development of teachers;
- recognize the ability of all students to learn mathematics and science;
- demand higher mathematics and science curriculum and performance standards for all students; and
- promote, for all students, equal access to technology—both instructive and, in the case of students with disabilities, assistive.

Increasing the participation of women, underrepresented minorities, and persons with disabilities in SET fields will not be easy. It will require different strategies for different groups. Americans must be prepared to invest in educational reforms that promise real payoffs down the road.

Recommendation: The Commission recommends the adoption and implementation of comprehensive high-quality education standards, at the state level, concerning mathematics and science curricula, mathematics and science teacher qualifications (as recommended by the Glenn Commission), technological assets, built environments, assistive technologies, and physical infrastructure.

- The National Commission on Mathematics and Science Teaching for the Twenty-First Century (the Glenn Commission) is addressing issues related to the national shortage of qualified mathematics and science teachers, and is creating action strategies to improve the quality of teaching in mathematics and science at all grade levels nationwide, and to ensure that an adequate supply of highly skilled mathematics and science educators enter and remain in teaching.
- The Commission recommends that all states adopt and enact legislation requiring school districts to collect achievement data on students disaggregated by socioeconomic status, limited English proficiency, disability status, race/ethnicity, and sex, and should hold districts, school boards, and schools accountable for the success of all subgroups in meeting state achievement standards.

Access to Higher Education

More than ever before, the ticket to a skilled job is a degree from an institution of higher education. However, while college enrollment is growing overall, the number of students who embark on SET majors is declining. And women, underrepresented minorities, and persons with disabilities—the smallest part of this shrinking pool of potential skilled labor—continue to face barriers, including low expectations of their academic potential, lack of finances, and inadequate precollege educational opportunities.

Special care must be given to understanding the distinct issues affecting these underrepresented groups at different points along the path to a college or postgraduate degree. For example, women are less likely than men to select SET majors, while African Americans and Hispanics are less likely to have access to the prerequisites for a SET major. Data on SET undergraduate students with disabilities is insufficient for analysis, pointing to a need for better information on this important group of potential SET workers.

In recent years, community colleges have provided increased access to higher education, currently enrolling close to half of all students who are women, African American, and persons with disabilities, as well as more than half of Hispanic and American Indian students. These institutions represent a rich source of potential SET talent that is too often ignored.



Recommendation #1: The Commission recommends aggressive, focused intervention efforts targeting women, underrepresented minority, and disabled students at the high school level, at the transition into postsecondary education, and at the community college transition into four-year colleges.

- High School Level: The Commission recommends the expansion and institutionalization of successful school-based and nonschool-based enrichment programs to (a) identify—through the use of authentic, nontraditional assessments that account for the differential experiences of students—potentially able students from underrepresented groups that have been plagued by inadequate educational opportunities; and (b) enroll them in accelerated academic preparation programs. Federal, state, and local partnerships should be established to identify and fund these intervention programs at an appropriate level.
- Community College: Community colleges enroll close to half of all students that are traditionally underrepresented in SET. The Commission recommends comprehensive and systemic institutional changes to strengthen SET education at two-year colleges and to facilitate transition of SET students from two-year colleges into four-year colleges.

Recommendation #2: The Commission recommends that the federal and state governments significantly expand financial investment in support of underrepresented groups in SET higher education, as well as institutions including, but not limited to, Minority Serving Institutions (Historically Black Colleges and Universities, or HCBUs; Hispanic Serving Institutions, or HSIs; and Tribal Colleges and Universities, or TCUs). Expansion of support to students should come through multiple grant mechanisms rather than loans, to include scholarships, fellowships, and internships. Expansion of support to institutions should include institutional awards, research assistantships, traineeships, and the expansion of proven programs.

- The Commission recommends that the federal government enact legislation to expand funding of the Pell Grant Program for SET students and SET education majors. It is recommended that the supplement have the same need requirements as the general Pell Grant, but effectually increase the maximum award to \$6,418 for the students identified in this special-needs group. This amount would cover the same proportion of institutional fees that the Pell Grant did in 1979-80, and may have the effect of substantially increasing the incentive for students to pursue SET careers.

The measure of success is parity with respect to population distribution in enrollment, academic performance, and graduation rates of all groups at each level.

Professional Life



Graduation is only the beginning. Once women, underrepresented minorities, and persons with disabilities complete SET degrees and begin their careers, what accounts for the higher rates of turnover and field switching that characterize their participation in the work force?

Not surprisingly, underrepresented SET professionals report barriers to success similar to those for SET students, including bias and the absence of mentoring, as well as obstacles specific to the working world, such as exclusion from informal networks, fewer opportunities to accrue management experience, and the difficulty of balancing work and family life. If employers want to gain the competitive edge that, studies have shown, accompanies diversity in the work force, they will have to modify a SET workplace culture to bridge the communications gap between people of differing cultures, gender, and socioeconomic backgrounds.

Recommendation: The Commission recommends that both public and private SET employers be held accountable for the career development and advancement of their employees who are women, underrepresented minorities, and persons with disabilities.

- The Commission recommends that the degree of participation, comparative pay, level of pay at hire, career development, and advancement of women, underrepresented minorities, and persons with disabilities in the SET workplace be reported yearly.
- The Commission recommends that SET diversity be a strategic goal in the private, public, nonprofit, and academic sectors. It also recommends the adoption of policies promoting a workplace environment that is inclusive and respects diversity. The measure of success for diversity in the workplace is parity among all subgroups in SET employment, retention, and promotion rates.
- The Commission recommends the development of a system of high-level, prestigious awards in order to recognize exemplary achievement by organizations that encourage among their employees a healthy balance between their work and personal lives through flexible, functional workplace policies and attitudes.

A national model should be developed of a workplace environment that is inclusive, values differences, and has flexible workplace policies.

The measure of ultimate success is parity relative to the general work force population distribution at different workplace and management levels, and equity in retention, pay, and promotion rates.

Public Image

Despite decades of social change, the general perception remains that technical workers, scientists, and engineers are unusually intelligent white men who are socially inept, absent-minded nerds. Advertisers, the entertainment media, and the news media have an influential role in shaping these perceptions. Caricatures of (mostly male) scientists continue to appear on billboards, in magazine ads, in movies, and on television sitcoms. Journalists also contribute to these distortions with stories that too often emphasize scientists and engineers as otherworldly geniuses working in isolation from society.



Such images discourage many underrepresented minorities, persons with disabilities, and especially women from pursuing any interest they may have in a SET career. Because they don't want to (and can't) be the people so often portrayed in the popular media, underrepresented youths and professionals are conditioned to accept the many other messages from our culture that tell them they cannot succeed in science or technology.

Popular media, especially television, can be a powerful tool for changing the public face of science and engineering. A critical step along the path toward a more diverse, and therefore, a more globally competitive SET work force in the United States will be public images of scientists and engineers that better reflect the talents and accomplishments of all citizens.

Recommendation: Identify or establish a body, representing public, nonprofit, and private sectors, to coordinate efforts to transform the image of the SET professions and their practitioners so that the image is positive and inclusive for women, underrepresented minorities, and persons with disabilities.

- Because several media campaigns to improve the image of scientists and engineers are already underway, our recommendation suggests that subsequent efforts build on and involve current campaigns, and also partner with natural allies such as underrepresented minority and women's groups, major science institutions, government agencies, trade organizations, and private foundations.

Sample measures of effectiveness include positive images represented in the Draw-a-Scientist Test, positive and increased media portrayal of underrepresented persons in science and engineering, and increased and well-positioned television airtime for these groups as they participate in SET professions.

Nationwide Accountability

The lack of diversity in SET education and careers is an old dilemma, but economic necessity and work force deficiencies bring a new urgency to the nation's strategic need to achieve parity in its SET work force. Real progress demands a system of accountability so that the Commission's objectives can be met in a timely, effective manner.

Recommendation: Establish or identify a collaborative body to continue the efforts of the Commission through the development, coordination, and oversight of strong, feasible action plans.

The responsibility of this continuing body will be to promote and monitor progress toward the Commission's goal of supplying our nation's SET work force needs through the development of the human resources represented by women, underrepresented minorities, and persons with disabilities. This collaborative body (whose members will include high-level persons from federal and state government, industry, academe, and the nonprofit sector, as well as students and teachers) will carry on the work of this Commission by developing and overseeing comprehensive action plans, and by securing resources that will help in reaching the Commission's goal of domestic work force parity in SET.

The continuing body has four charges:

- Develop action items to implement the recommendations developed by the Commission.
- Further develop appropriate existing programs, using the recommendations of the Commission as a point of reference.
- Coordinate and assign actions/programs to appropriate sectors (government, industry, academe), and ensure funding and resources.
- Monitor progress through ongoing data compilation and analysis.

A Call to Action

Our country's economic and intellectual prosperity depends more than ever on a ready supply of well-prepared, skilled workers. If women, underrepresented minorities, and persons with disabilities continue to be excluded from the SET pipeline, even as they make up an ever-growing proportion of the work force, the nation will find itself increasingly unable to meet its toughest challenges and responsibilities. The time has come for us to go beyond simply restating the problem and to take specific steps designed to achieve measurable results.

To obtain a copy of the full report, visit the Commission's Web site at **www.nsf.gov/od/cawmset** or call **703-306-0597**. The Web site also includes other information about the Commission and related issues.

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